

Term Project Phase 4: Signal Alignment

(100 points)

Assigned Date: Wednesday, December 4, 2013

Due Date: Wednesday, December 18, 2013

Educational Goal

Become familiar with the WCL project and apply machine learning to signal alignment on temperature data and ISE reading.

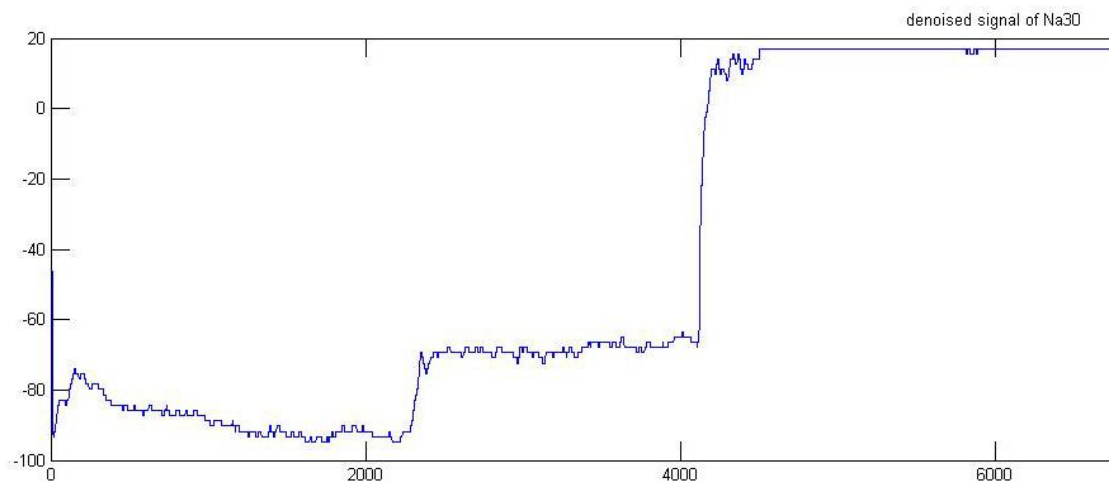
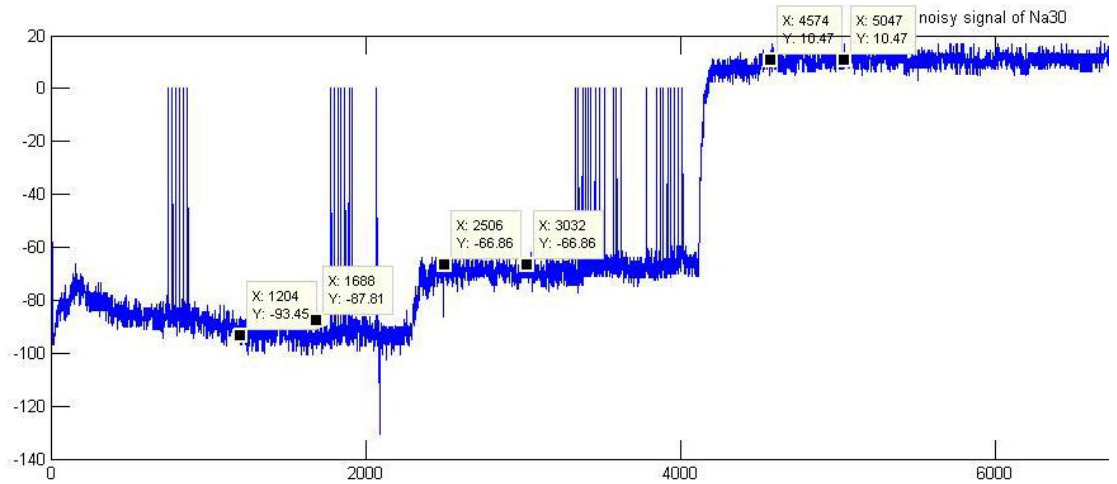
Dataset Description

We use Bayesian white noise denoising in the wavelet domain to remove the noise from the ISE sodium signal and temperature of Sol30. All the datasets to be used in Term Project Phase 4 can be downloaded from http://www.cs.umb.edu/~ding/classes/470_670/homework/data/phase_4/. There are 8 data files including

1. na30.csv for the denoised ISE signal of sodium
2. temp30.csv for the denoised temperature
3. phase1.csv for the denoised ISE signal of sodium in WCL phase1
4. phase2.csv for the denoised ISE signal of sodium in WCL phase2
5. phase3.csv for the denoised ISE signal of sodium in WCL phase3
6. temp1.csv for the denoised temperature in WCL phase1
7. temp2.csv for the denoised temperature in WCL phase2
8. temp3.csv for the denoised temperature in WCL phase3

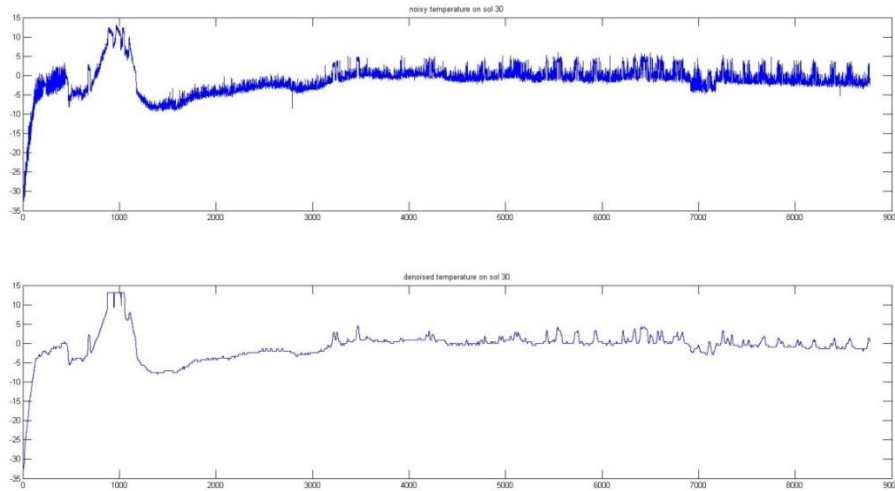
1. File name: na30.csv

Description: The denoised ISE signal of sodium(Na) on Sol 30. We have selected 3 periods of the signal data including WCL phase 1, WCL phase 2, and WCL phase 3. The 3 periods are labeled in the figure below along the plot of the denoised signal of the 3 periods (the 2nd figure below).



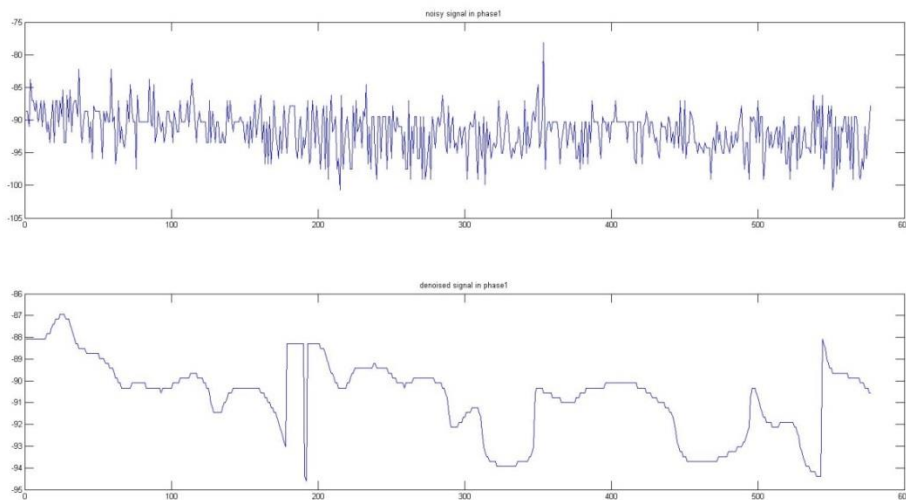
2. File name: Temp30.csv

Description: Denoised temperature data on Sol 30.



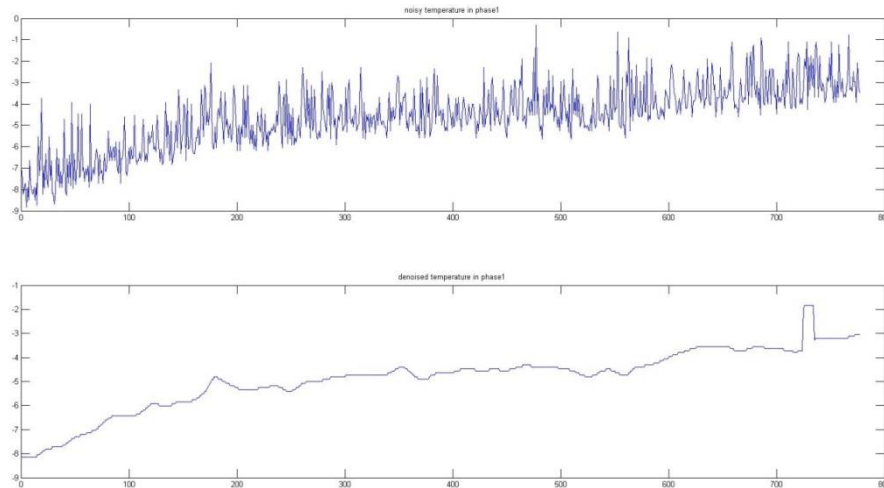
3. File name: phase1.csv

Description: The denoised ISE signal of sodium(Na) on Sol 30 in WCL phase 1 during leaching solution phase.



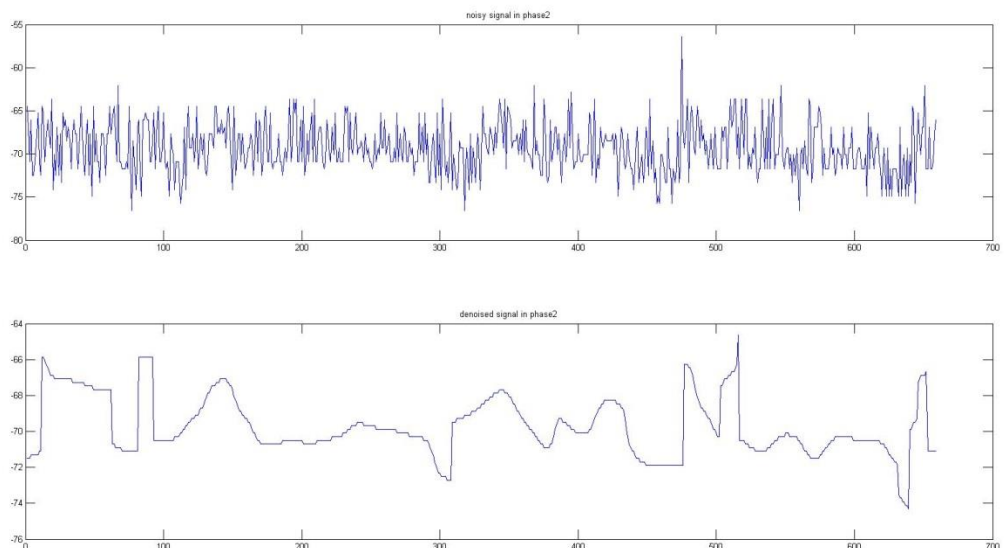
4. File name: temp1.csv

Description: The denoised temperature data on Sol 30 in WCL phase 1 during leaching solution phase. Notice that we select the same period as phase1.csv above with 100 sampling points beyond the beginning point and ending point, in case of shifting for signal alignment.



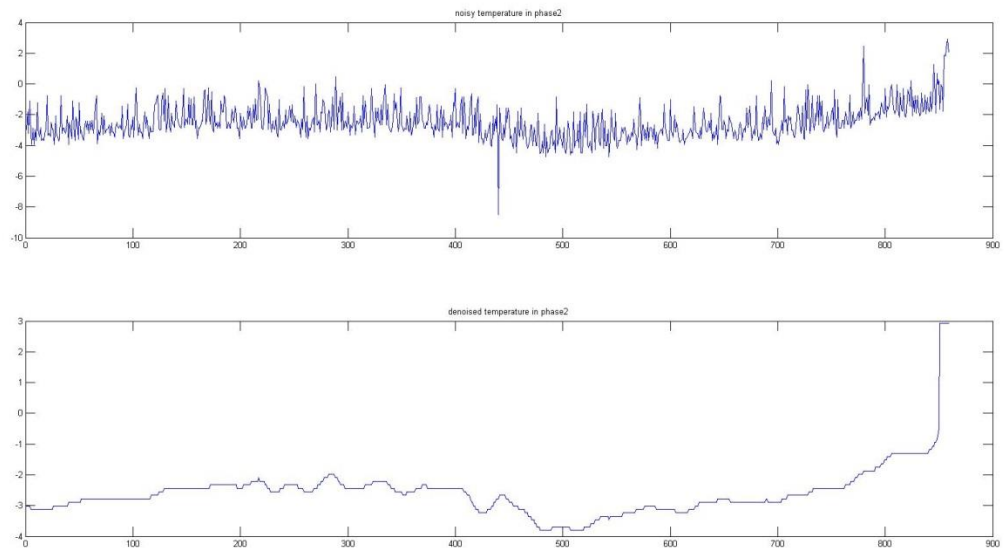
5. File name: phase2.csv

Description: The denoised ISE signal of sodium(Na) on Sol 30 in WCL phase 2 during leaching solution phase.



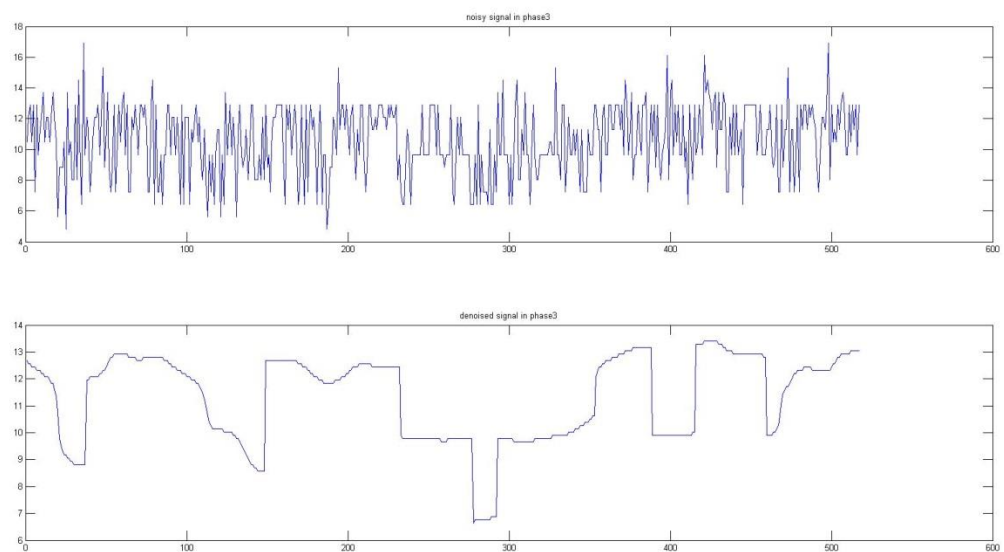
6. File name: temp2.csv

Description: The denoised temperature data on Sol 30 in WCL phase 2 during leaching solution phase. Notice that we select the same period as phase1.csv above with 100 sampling points beyond the beginning point and ending point, in case of shifting for signal alignment.



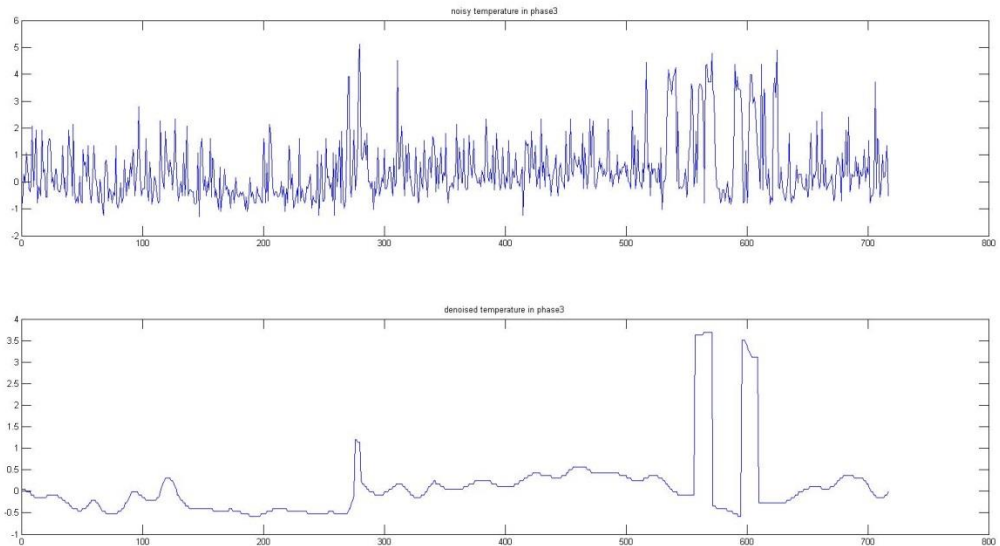
7. File name: phase3.csv

Description: The denoised ISE signal of sodium(Na) on Sol 30 in WCL phase 3 during leaching solution phase.



8. File name: temp3.csv

Description: The denoised temperature data on Sol 30 in WCL phase 3 during leaching solution phase. Notice that we select the same period as phase1.csv above with 100 sampling points beyond the beginning point and ending point, in case of shifting for signal alignment.



Requirements

- Use simulated annealing local search method to find the best signal alignment result.
- Write a report to discuss how you choose temperature T , the random downward move, and the choice of the objective function. The report should also discuss your experimental results.

Submission Requirements

1. One submission per team.
2. Submit all the scripts you used for this project.
3. Submit a single zipped file of all the files of this assignment through your UMassOnline account. Submit the paper copy along with the cover page in class. Paper copy should be bound firmly together as one pack (for example, staple, but not limited to, at the left corner). 5 points will be deducted for unbounded homework.
4. Name your file with AI_ lastname_ firstname_ team#_ ph4. For example, team 1 should name their file as AI_team1_ph4.zip.
5. No hard copies or soft copies results in 0 points.
6. Demonstrate your project with the Instructor on ??(TBD) after the class.